

## **REMARKS**

Favorable reconsideration is respectfully requested.

The claims are 10 to 19.

The above amendment presents a new set of claims wherein claims 10 to 11 and 13 to 19 correspond to previous claims 1 to 9 respectively and new claim 12 corresponds to preferred elements of previous claim 2.

These claims have been slightly redrafted to make them clearer.

For convenience, the following abbreviations will be used in this response: PE = a carboxy functional polyester, IPA = isophthalic acid, TPA = terephthalic acid and NPG = neopentyl glycol.

Claims 1 to 4 and 6 to 9 have been rejected under 35 U.S.C. 102(b) as being anticipated by Panandiker et al. (U.S. 5,637,654).

Further, claims 1 and 5 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Panandiker.

These rejections are respectfully traversed.

## **The Present Invention**

The present invention relates to polyesters rich in IPA and NPG and that are suitable for use in powder coatings to give at the same time good weatherability, making them suitable for outdoor applications, flexibility, flow and degassing properties.

In contrast, Panandiker addresses a different issue of perceived problems with prior art powder compositions that cure at low temperatures (col. 3, lines 17 to 45 and lines 55 to 60). To achieve the desired properties, Panandiker teaches use of a particular catalyst. When formulating within the generic disclosure of Panandiker, a skilled reader would optimize properties for the problem addressed therein and not for that solved by the present invention.

## **Novelty**

The invention as presently claimed provides amorphous PEs (and powder coatings made from them) that are rich in both IPA ( $\geq 81\%$  mole of polyacid) and have also  $\geq 35\%$  mole NPG plus  $\geq 15\%$  linear C<sub>4-16</sub> diol. The rejection acknowledges that Panandiker does not explicitly describe PEs with these components. Nor does Panandiker specifically describe morphology of the polyesters used therein as amorphous.

The present claims are therefore a novel selection over the broad and generic disclosures and possible permutations of theoretical combinations of features described in Panandiker.

**Non-obviousness**

A reader of Panandiker is actively taught away from making a powder formulation with many of the key elements of the present claims.

Panandiker teaches that amorphous polyesters are disadvantageous. For example, col. 3, lines 44 to 46 state:

*“Amorphous polyesters generally have a viscosity at 200°C of from 11-110 poise, which also hinders the formation of a homogenous film”*

This teaches a reader away from selecting amorphous polyesters to provide powders having improved low temperature curing, which is the problem addressed by Panandiker.

Although the rejection acknowledges that the examples of Panandiker do not disclose simultaneously 81 mol% IPA, 35 to 65 mol% NPG and 15-65 mol% hexanediol, it goes on to assert that the present claims are obvious because replacing the TPA with IPA in the formulations of Panandiker would decrease the  $T_g$  of the PE and increase flexibility and weatherability of the coating.

However this is reading Panandiker with knowledge of the invention and is not following what Panandiker teaches when read alone. The features of Panandiker selected and combined as per the rejection have been extracted from a very generic disclosure, are out of context and use impermissible *ex post facto* analysis.

Panandiker teaches: *“In an important aspect of the invention the TPA/IPA molar ratio is in the range of about 60/40 to about 75/25. In an alternative aspect of the invention the IPA may be replaced with tertiary butyl isophthalic acid”* (col. 6, lines 19 to 22).

Panandiker goes on to say: *“In another important aspect of the invention, by eliminating TPA and using all IPA, no cyclic oligomer is formed and hence no blooming occurs. In order to obtain improved mechanical properties, cyclohexane dimethanol is used in place of NPG”* (col. 6, lines 24 to 28).

These statements are confirmed and reinforced by the data in the Tables. For convenience, submitted herewith as an attachment to this response is Table 1 of Panandiker wherein the amounts

of each polyacid or polyol ingredient given in grams by Panandiker, have been recalculated as percent of total polyacid moles or total polyol moles.

It can be seen that Examples 2A and 2E to 2I are made from PEs with > 80% IPA but these examples do not contain NPG. The other Examples of Panandiker do contain NPG (Examples 1, 2B, 2C, 2D & 2J) are formulated with PEs made from at most 34% IPA (Example 2C), which is much less than the 81% of IPA required in the present invention.

A reader of Panandiker is taught that it is important either to use low amounts of IPA or if 100% IPA is used, not to use NPG at all. A skilled person would be actively deterred by Panandiker from preparing IPA rich (>81% mole) PEs using NPG.

Thus present invention is non-obvious from Panandiker.

Claims 1 to 9 have been rejected under 35 U.S.C. 102(b) as being anticipated by Moens et al. (WO 98/18862 and corresponding to U.S. 6,635,721).

This rejection is also respectfully traversed.

Carboxy functional amorphous PEs of claim 10 of the present invention (optional features omitted) have the following elements:

PE of acid number 12 to 34 mg KOH/g prepared from:

a polyacid comprising 81 to 100% mole IPA; and

a polyol comprising:

15 to 65% mole linear chain aliphatic C<sub>4</sub>-C<sub>16</sub>diol(s); and

35 to 85% mole NPG.

Carboxy functional amorphous PEs used as component of a PE mixture in U.S. 6,635,721 (Moens) have the following features:

PE of acid number 15 to 100 mg KOH/g and prepared from:

a polyacid comprising 70 to 100% mole IPA; and

a polyol comprising:

70 to 100% mole of NPG and/or 2-butyl-2-ethyl-1,3-propanediol.

In Moens using other aliphatic and/or cycloaliphatic polyols are optional (0-30 mol%).

There is no explicit teaching in Moens that use of linear aliphatic C<sub>4</sub>-C<sub>16</sub>diols would be advantageous over other types of polyols. There are thirteen such optional polyols specifically

mentioned in Moens (col. 6, lines 23 to 33) and of these, four contain three or four hydroxy groups, and a further four are cyclic or branched. This does not teach use of linear as opposed to any other type of diol.

Moens does not suggest there is any particular reason to use such linear aliphatic C<sub>4</sub>-C<sub>16</sub>diols in amounts of at least 15% to make amorphous PEs. The exemplified amorphous PEs in Moens used different polyols to those of the present invention generally in a much lower total amount than 15 mole %. Of the non NPG polyols use to prepare the exemplified amorphous polyesters in Moens, none were linear chain aliphatic C<sub>4</sub>-C<sub>16</sub>diol(s) and none of these other polyols were used individually in an amount greater than 13.9 mole % (see following table). Example 6 does not use NPG and therefore is a further disincentive for a reader of Moens to modify the examples to obtain amorphous polyesters of the present invention.

Mole % of Amorphous polyesters described in Moens

	Ex 1	Ex 2	Ex 4	Ex 5	Ex 6	Ex 7	Comp 10
<b>POLYACIDS</b>							
<b>terephthalic acid (TPA)</b>	0.0	20.0	0.0	0.0	0.0	0.0	83.7
<b>isophthalic acid (IPA)</b>	100.0	80.0	100.0	100.0	100.0	100.0	16.3
<b>POLYOLS</b>							
<b>neopentyl glycol (NPG)</b>	95.9	95.9	100.0	92.2	0.0	81.7	100.0
<b>2-butyl-2-ethyl-1,3 propane diol</b>	0.0	0.0	0.0	0.0	95.3	0.0	0.0
<b>neopentyl glycol hydroxy pivalate (NHP)*</b>	0.0	0.0	0.0	0.0	0.0	13.9	0.0
<b>trimethylol propane (TMP)</b>	4.1	4.1	0.0	7.8	4.7	4.4	0.0

*\* 3-hydroxy-2-2-dimethylpropyl-3-hydroxy-2-2-dimethylpropionate*

Thus to arrive at the polyesters of the present invention, a reader of Moens would have to formulate using amorphous polyesters alone, directly contrary to the teaching therein to use no more than 95% by weight amorphous PE in the PE mixture.

For example in Moens, an amorphous polyester was formulated alone in test Examples 27, 28, 31 and 32 of Moens. Examples 27 and 28 use the polyester of Example 10 above which is rich

in TPA but has much lower IPA than the present invention. Examples 31 and 32 use Example 1 made from 100% IPA. The passage in col. 19, lines 1 to 17, of Moens states explicitly that an amorphous PE which is rich in IPA has only mediocre mechanical properties combined to either mixtures of amorphous and semi-crystalline PEs or amorphous PEs rich in TPA. So a reader of Moens is taught directly away from the present invention.

Even if a reader of Moens decides to ignore the teaching therein and formulate powder compositions with 100% of the amorphous PE rich in IPA exemplified in Moens, this still does not arrive at the present invention. The reader must modify these examples within in a manner not explicitly taught in Moens.

For example, the reader must select as the polyol component, in addition to NPG, at least 15 mole % of a particular subset of linear diols not highlighted in Moens. There is no motivation or teaching in Moens to make this selection and with no examples suggesting use of such linear diols. The resultant amorphous polyester also has to be selected to have an acid number within a much narrower range than that taught in Moens. To make all these selections and modifications to the examples of Moens and over the express teaching therein not to use 100% amorphous IPA rich PE requires advanced knowledge of the target to be achieved and thus uses impermissible hindsight. Otherwise why would a reader of Moens chose to modify the examples therein when given no reason to do so?

In sum, polyesters having the exact properties as claimed in the present claims are not explicitly described in Moens nor are they obvious therefrom. It would be counter to the teaching of Moens to formulate a powder composition without a semi-crystalline polyester and therefore non-obvious for a reader of Moens to select polyesters within the generic disclosures of Moens that might be suitable for use as the sole polyester component in a powder composition.

For the foregoing reasons, it is apparent that the rejections on prior art are untenable and should be withdrawn.

Claims 1 to 9 have been rejected under 35 U.S.C. 101 on double patenting for claiming the same invention as that of claims 1, 11, 12, 13 and 17 of prior U.S. Patent No. 6,635,721.

Further, claims 1 to 9 have been provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 to 9 of copending

Application No. 10/544,336. Although the conflicting claims are not identical, they are said to be not patentably distinct from each other because they are related to the same amorphous polyester.

These rejections are respectfully traversed.

The present claims are neither the same as or obvious from the claims of Moens for reasons set forth above.

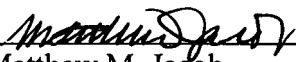
Accordingly, the double patenting rejections are untenable.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

Respectfully submitted,

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US 5637654 Exemplified polyesters TABLE 1

Moles as % polyacid or polyol (to 1 decimal place)

MW      1      2A      2B      2C      2D      2E      2F      2G      2H      2I      2J

**POLYACIDS**

terephthalic acid	166.14	49.2	49.2	51.0	49.2						49.5
isophthalic acid	166.14	32.8	80.8	32.7	34.0	32.8	80.2	80.3	80.2	90.0	33.0
adipic acid	146.14		19.2		15.0	18.0					
fumaric acid	116.07	18.0		18.0		19.8					17.5

**succinic anhydride**

19.7

**glutaric acid**

19.8

**1,4 cyclohexane  
dicarboxylic acid**

20.0

**azelaic Acid**

10.0

**POLYOLS**

Mole % as percentage of total polyol moles (to 1 decimal place)

neopentyl glycol	104.15	84.5	84.5	99.6	98.1						84.5
hexanediol-1,6	118.00	15.0									15.0

**butanediol-1,4**

15.0

**2-butyl-2-ethyl-1,3  
propane diol**

10.3

10.3

10.3

10.2

10.3

**1,4-cyclohexane  
dimethylol**

	144.00	0.5	89.7	0.5	0.4	0.5	89.7	73.4	89.7	89.8	0.5
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**trimethylol propane**

1.3

134.20

